Ethernet Module *NX5000*

Nexto Series

Doc. Code: CE114903 Revision: B

Product Description

Nexto Series is a powerful and complete Programmable Logic Controller (PLC) with unique and innovative features. Due to its flexibility, smart design, enhanced diagnostics capabilities and modular architecture, Nexto PLC can be used for control systems in medium and high-end applications or in high speed machinery

NX5000 redundancy link module, a part of Nexto Series, is used in applications that require more Ethernet Interfaces than already available on Nexto CPUs or in applications where is necessary a high availability of automation system with uses of network redundancy.

Its main features are:

- Simultaneous support to MODBUS TCP and MODBUS RTU over TCP
- Simultaneous operation as MODBUS master/client and server/slave
- Redundant architecture support (half-cluster)
- Network redundancy support (NIC teaming)
- Hot swap support
- Auto crossover Ethernet Interface
- All configuration and parameterization through MasterTool IEC XE
- One Touch Diag
- Electronic Tag on Display
- LCD and LED for diagnostic indication
- Gratuitous ARP after CPU configuration and as active interface (redundancy)
- Supports up to128 simultaneous connections
- Protection against flood attacks

Ordering Information

Included Items

The product package contains the following items:

- NX5000 module
- Installation guide

Product Code

The following code should be used to purchase the product:

Code	Description
NX5000	Ethernet Module

Innovative Features

Nexto Series brings to the user several innovations in utilization, supervision and system maintenance. These features were developed focusing a new experience in industrial automation. The list below shows some new features that users will find in the NX5000 module:

One Touch Diag ™: One Touch Diag is an exclusive feature that Nexto Series brings to PLCs. With this new concept, the user can check diagnostic information of any module present in the system directly on CPU's graphic display with one single press in the diagnostic switch of the respective module. OTD is a powerful diagnostic tool that can be used offline (without supervisor or programmer), reducing maintenance and commissioning times.

ETD – Electronic Tag on Display: Another exclusive feature that Nexto Series brings to PLCs is the Electronic Tag on Display. This new functionality brings the process of checking the tag names of any I/O pin or module used in the system directly to the CPU's graphic display. Along with this information, the user can check the description, as well. This feature is extremely useful during maintenance and troubleshooting procedures.

DHW – Double Hardware Width ™: Nexto Series modules were designed to save space in user cabinets or machines. For this reason, Nexto Series delivers two different module widths: Double Width (two backplane rack slots are required) and Single Width (only one backplane rack slot is required). This concept allows the use of compact I/O modules with a high-density of I/O points along with complex modules, like CPUs, fieldbus masters and power supply modules.

iF Product Design Award 2012: Nexto Series was the winner of iF Product Design Award 2012 in industry + skilled trades group. This award is recognized internationally as a seal of quality and excellence, considered the Oscars of the design in Europe.

Product Features

General Features

	NX5000
Backplane rack occupation	2 sequential slots
HSDN	Yes
Hot swap support	Yes
Status and diagnostic indication	Display, web pages and CPU's internal memory
One Touch Diag (OTD)	Yes
Electronic Tag on Display (ETD)	Yes
Isolation **NET 1 to logic** **NET 1 to protective earth** ⏚ **Logic to protective earth** ⏚	 1500 Vac / 1 minute 1500 Vac / 1 minute 1250 Vac / 1 minute
Current consumption from backplane rack power supply	400 mA
Power dissipation	2 W
IP level	IP 20
Operating temperature	0 to 60 °C
Storage temperature	-25 to 75 °C
Operating and storage relative humidity	5 to 96 %, non-condensing
Conformal coating	Yes
Standards	IEC 61131-2 CE, Electromagnetic Compatibility (EMC) and Low-Voltage Directive (LVD) CE
Module dimensions (W x H x D)	36.00 x 114.63 x 115.30 mm
Package dimensions (W x H x D)	44.00 x 122.00 x 147.00 mm
Weight	250 g
Weight with package	300 g

Notes

HSDN (High Speed Deterministic Network): HSDN is the name given to a network where the user can determine the maximum latency for a given data transfer.

Logic: Logic is the name for the internal interfaces such as processors, memories and backplane rack interfaces.

Conformal coating: Conformal coating protects the electronic components inside the product from moisture, dust and other harsh elements to electronic circuits.

NET 1

	NX5000
Connector	RJ45 female shielded
Auto Crossover	Yes
Maximum cable size	100 m
Cable type	UTP or ScTP, level 5
Baud rate	10/100 Mbps

Physical layer	10/100BASE-TX
Data link layer	LLC (Logical Link Control)
Network layer	IP (Internet Protocol)
Transport layer	TCP (Transmission Control Protocol)
Application layer	MODBUS TCP client MODBUS TCP server MODBUS RTU over TCP master MODBUS RTU over TCP slave
Tcp port configurable range	2 to 65534
Maximum sockets supported value	128
Gratuitous ARP messages	Yes
Diagnostics	LEDs – green (speed), yellow (link/activity)
Isolation	1500 Vac / 1 minute

Notes

NET 1: Ethernet interface cannot be used for programming and debugging Nexto Series CPUs.

Gratuitous ARP: NET1 Ethernet interface sends spontaneously ARP type packets in broadcast, informing its IP and MAC address for all devices interconnected to the network. These packets are sent during the download of a new application by the MasterTool IEC XE software and in the startup of a NX5000 interface. 5 ARP commands are sent, with an initial interval of 200 ms, doubling the interval between every new triggered command, totalizing 3 s. Example: First trigger occurs at time 0, the second one at 200 ms, the third one at 600 ms and so forth until the fifth trigger occurs at time 3 s.

Compatibility with Other Products

Nexto Series' CPUs documentation must be consulted to check which CPUs allows the use of NX5000 modules. The table below shows from which software version and product revision the listed modules are compatible with NX5000.

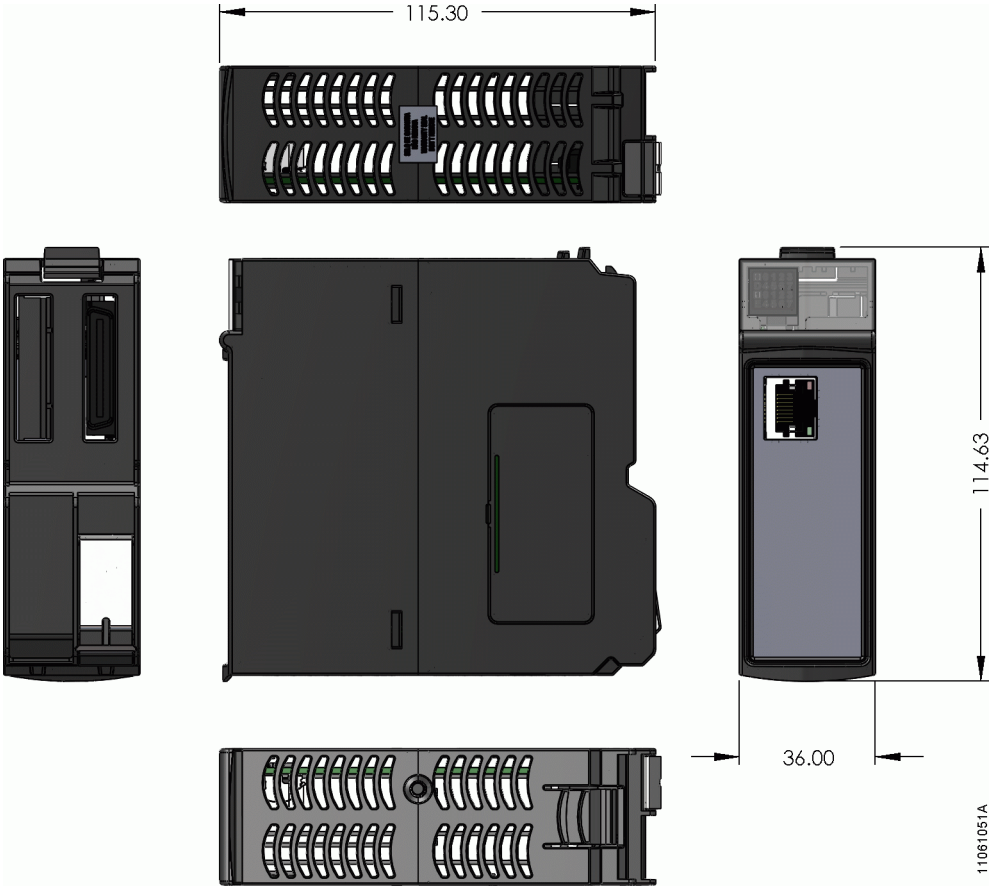
	Software/firmware version	**Product revision**
MT8500	1.20 or higher	AC or higher

Notes

Product review: if the software/firmware is upgraded in the field, the product reviewing indicated on the label will no longer match the actual review of the product.

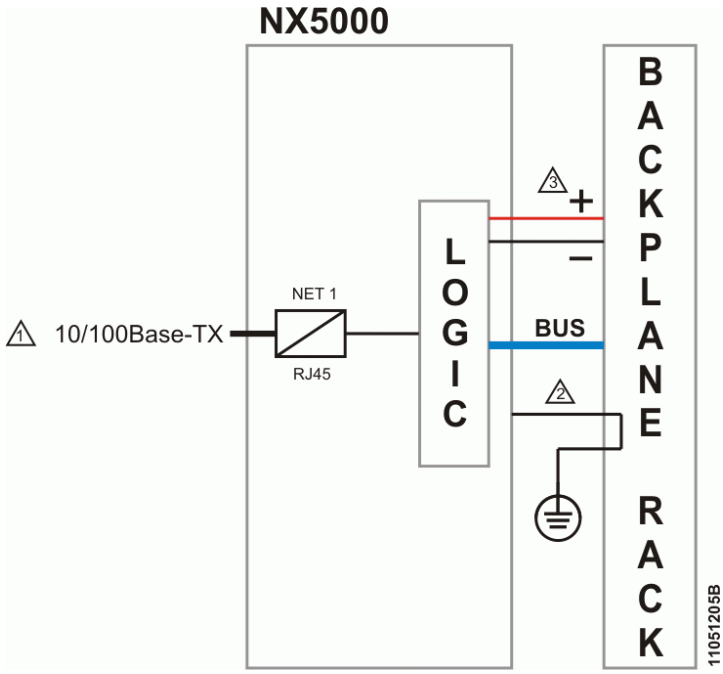
Physical Dimensions

Dimensions in mm.



Installation

The following figure shows the electrical installation on the rack (backplane rack).



All information about electrical installation, mechanical assembly and module insertion can be found at Nexto Series User Manual - MU214000.

Configuration

Nexto Series CPUs User Manual - MU214605 must be consulted for information about module configuration.

Process Data

The process data, when available, are the variables used for access and module control. The table below shows all the variables delivered by NX5000.

Process data	Description	Type	Update
Reserved	Reserved for internal use	%QB (Read/ Write)	Always
Reserved	Reserved for internal use	%QB (Read/ Write)	Always
Reserved	Reserved for internal use	%IW (Read)	Always
Reserved	Reserved for internal use	%IW (Read)	Always
Reserved	Reserved for internal use	%IW (Read)	Always

Note

Update: this field indicates if the respective process data is updated by CPU and NX5001. If it is set as Always, it means that the process data is always updated.

Module Parameters

Name	Description	Standard value
Initial address of Module Diagnostics on %Q	Sets initial address of module Diagnostics.	-

Note

Standard value: MasterTool IEC XE programmer fills it automatically, but allows the user to edit its initial offset. The limit depends on the CPU supported model (details at CPUs Nexto Series User Manual – MU214605).

Maintenance

Altus recommends that all modules' connections be checked and that all dust or any kind of dirt at the module's enclosure be removed at least every 6 months.

NX5000 offers five important features to assist the user during maintenance: Electronic Tag on Display, One Touch Diag, Status and diagnostics indicators, web page with complete status and diagnostics list and status and diagnostics mapped to internal memory.

Electronic Tag on Display and One Touch Diag

Electronic Tag on Display and One Touch Diag are important features that provides for the user the option to check the tag, description and diagnostics related to a given module directly on the CPU display.

To check the tag and diagnostics of a given module, it's required only one short press on its diagnostic switch. After pressing once, CPU will start to scroll tag information and diagnostic information of the module. To access the respective description for the module, just long press the diagnostic switch of the respective module.

More information about Electronic Tag on Display can be found at Nexto CPU User Manual – MU214605.

Status/Diagnostic Indications

All Nexto slave modules have a display with the following symbols: D, E, 0, 1 and numeral characters. The states of the symbols D, E, 0, 1 are common for all Nexto series slave modules, these states can be consulted in the table below.

The meaning of the numeral characters can be different for specific modules.

D and E States

D	E	Description	Causes	Solution	Priority
Off	Off	Display fail or module off	Disconnected module. No Power supply. Hardware failure	Check if the module is completely connected to the backplane rack and if the backplane rack is supplied by an external power supply.	-
On	Off	Normal use	-	-	9 (Lower)
Blinking 1x	Off	Active Diagnostic	There is at least one active diagnostic related to the module NX5000	Check what the active diagnostic is. More information can be found at Maintenance section of this document	8
Blinking 2x	Off	CPU in STOP mode	CPU in STOP mode	Check if CPU is in RUN mode. More information can be found on CPU's documentation	7
Blinking 3x	Off	Reserved	-		6
Blinking 4x	Off	Non fatal fault	Failure in some hardware or software component, which does not have impact on the basic functionality of the product	Check the module diagnostic information. If it is a hardware fault, provide the replacement of this part. If it is a software fault, please contact the Technical Support	5

Off	Blinking 1x	Parameter error	-	Check if the module parameters are correct	4
Off	Blinking 2x	Loss of master	Loss of communication between module and CPU	Check if the module is completely connected to the backplane rack. Check if CPU is in RUN mode.	3
Off	Blinking 3x	Reserved	-	-	2
Off	Blinking 4x	Fatal hardware error	Hardware error	Contact Altus' support team in case of fatal hardware error.	1 (Higher)

Notes

Fatal hardware fault: Please contact Altus' support team in case of fatal hardware fault.

0, 1 and Numeral Characters

The segments 0 and 1 should be normally off. These two segments will start to blink when the module is on the Diagnostic Mode (Electronic Tag on Display and One Touch Diag).

RJ45 Connector LEDs

Both LEDs placed in the RJ45 connector; identified by NET 1, help the user in the installed physical network problem detection, indicating the network LINK speed and the existence of interface communication traffic. The LEDs description is presented in the table below.

Yellow	Green	Description
Off	Off	Network LINK absent.
On	Off	10Mbits/s network LINK.
On	On	100Mbits/s network LINK.
Blinking	–	Occurrence of Ethernet network transmission or reception, for or to this IP address. It blinks when there's module demand, not on every transmission or reception, i.e. blinking frequency doesn't correspond to data transmission or reception frequency.

Web Page with Complete Status and Diagnostic List

Another way to access diagnostic information on Nexto Series is via web pages. Nexto Series CPUs have an embedded web pages server that provides all Nexto status and diagnostic information, which can be accessed using a simple browser.

More information about web page with complete status and diagnostic list can be found at Nexto Series CPUs' User Manual – MU214605.

Status and Diagnostics Mapped to Variables

All NX4010's diagnostics can be accessed through variables that can be handled by the user application or even forwarded to a supervisory system using a communication channel. There are two different ways to access diagnostics in the user application: using symbolic variables with AT directive or addressing memory. Altus recommends use symbolic variables for diagnostic accessing. The table below shows all available diagnostics for NX4010 and their respective memory address, description, symbolic variable and string that will be shown on the CPU graphical display and web.

Direct Representation Variable		Diagnostic Message	Symbolic Variable DG_NX5000	Description
Variable	**Bit**			
%QB(n)	**0..7**	Reserved		
%QB(n+1)	**0**	MODULE W/ DIAGNOSTICS	tGeneral.bActiveDiagnostics	TRUE – Module has active diagnostics
		-		FALSE – Module doesn't have active diagnostic
	1	MODULE W/ FATAL ERROR	tGeneral.bFatalError	TRUE – Fatal error
		-		FALSE – No fatal error
	2	CONFIG. MISMATCH	tGeneral. bConfigMismatch	TRUE – Parameter error
		-		FALSE – Parameters ok
	3	WATCHDOG ERROR	tGeneral. bWatchdogError	TRUE – Watchdog has been detected
		-		FALSE – No watchdog
	4	OTD SWITCH ERROR	tGeneral. bOTDSwitchError	TRUE – Failure on the diagnostic switch
		-		FALSE – No failure on the diagnostic switch
	5..7	Reserved		
%QB(n+2)	**0**	NET 1 LINK DOWN	tNX5000.bStsEthLink	TRUE – NET 1 interface not properly connected
		-		FALSE – Interface NET 1 connected
	1	-	tNX5000.bNX5000NoCfg	TRUE – Internal failure on NET 1 interface
		-		FALSE – No internal failure on NET 1 interface
	2..7	Reserved		
%QB(n+3)	**0..7**	-	tNX5000.bStsEthSpd	0- NET 1 Link down 1- NET1 10 Mbps 2- NET1 100 Mbps

Notes

Direct Representation Variable: "n" is the address defined in the field %Q Start Address of Diagnostic Area on the NX5000's configuration screen – Modules Parameters tab in the MasterTool IEC XE.

Symbolic Variable: Some symbolic variables serve to accessing diagnostics. This diagnostics are stored into the addressing memory, then the AT directive is used to map the symbolic variables in the addressing memory. The directive AT is a reserved word in the MasterTool IEC XE that uses this directive to declares the diagnostics automatically on a symbolic variables. All symbolic variables declared automatically can be found inside of Diagnostics object.

Detailed Diagnostics

The list below indicates additional information related to NX5000's status and diagnostics that can be found on variables.

Direct Representation Variable	Size	AT Variable DG_modulename. tStsEthernet	Description
%QB(n+4)	BYTE	byIPStringSize	Size of szIPAddress
%QB(n+5)	STRING(16)	szIPAddress	NET1 address IP
%QB(n+21)	BYTE	byMaskStringSize	Size of szSubnetworkMask
%QB(n+22)	STRING(16)	szSubnetworkMask	NET1 sub network mask
%QB(n+38)	BYTE	byGatewayStringSize	Size of szGatewayAddress
%QB(n+39)	STRING(16)	szGatewayAddress	NET1 gateway
%QB(n+55)	BYTE	byMACStringSize	Size of szMACAddress
%QB(n+56)	STRING(18)	szMACAddress	NET1 MAC address
%QW(n+74)	WORD	-	Reserved
%QD(n+76)	DWORD	dwPacketsSent	Total packets sent
%QD(n+80)	DWORD	dwPacketsReceived	Total packets received
%QD(n+84)	DWORD	dwBytesSent	Total bytes sent
%QD(n+88)	DWORD	dwBytesReceived	Total bytes received
%QW(n+92)	WORD	wTXErrors	Transmission errors
%QW(n+94)	WORD	wTXDropErrors	Transmission drop errors
%QW(n+96)	WORD	wTXCollisionErrors	Transmission collision errors
%QW(n+98)	WORD	wRXErrors	Receiving errors
%QW(n+100)	WORD	wRXDropErrors	Receiving drop errors
%QW(n+102)	WORD	wRXFrameErrors	Receiving frame errors

Manuals

For correct application, MODBUS configuration and utilization Nexto Series CPUs User Manual - MU214605 must be consulted.

For further technical details, configuration, installation and programming of Nexto Series, the table below should be consulted.

The table below is only a guide of some relevant documents that can be useful during the use, maintenance, and programming of NX5000. The complete and updated table containing all documents of Nexto Series can be found at Nexto Series User Manual – MU214600.

Document code	Description	Language
CE114000 **CT114000** **CS114000**	Nexto Series – Features and Configuration Série Nexto – Características e Configurações Serie Nexto – Especificaciones y Configuraciones	English Portuguese Spanish
MU214600 **MU214000** **MU214300**	Nexto Series User Manual Manual de Usuário Série Nexto Manual Del Usuario Nexto	English Portuguese Spanish
MU214605 **MU214100** **MU214305**	Nexto Series CPUs User Manual Manual de Usuário UCPs Série Nexto Manual del Usuario UCPs Serie Nexto	English Portuguese Spanish
MU299609 **MU299048** **MU299800**	MasterTool IEC XE User Manual Manual de Usuário MasterTool IEC XE Manual del Usuario MasterTool IEC XE	English Portuguese Spanish